

**WHAT IS CLAIMED IS:**

1           1. For use in a video processing system of the type  
2 comprising a chain of video processing algorithms for processing a  
3 video stream, a system for optimizing at least one control  
4 parameter setting of at least one of said video processing  
5 algorithms in said chain of video processing algorithms, said  
6 system comprising:

7 an optimization unit comprising an algorithm capable of  
8 optimizing said at least one control parameter setting of said at  
9 least one video processing algorithm.

2. The system as claimed in Claim 1 further comprising an objective quality metric unit coupled to said optimization unit, said objective quality metric unit capable of receiving an output video stream from said chain of video processing algorithms, and capable of determining a fitness value that characterizes the video quality of said output video stream, and capable of providing said fitness value to said algorithm in said optimization unit.

1           3. The system as claimed in Claim 2 wherein said algorithm  
2        in said optimization unit optimizes said at least one control  
3        parameter setting of said at least one video processing algorithm  
4        using said fitness value.

1       4. The system as claimed in Claim 1 wherein said  
2 optimization unit comprises an algorithm that is capable of  
3 optimizing a plurality of control parameter settings of each of a  
4 plurality of video processing algorithms in said chain of video  
5 processing algorithms.

1       5. The system as claimed in Claim 4 further comprising an  
2 objective quality metric unit coupled to said optimization unit,  
3 said objective quality metric unit capable of receiving an output  
4 video stream from said chain of video processing algorithms, and  
5 capable of determining a fitness value that characterizes the video  
6 quality of said output video stream, and capable of providing said  
7 fitness value to said algorithm in said optimization unit.

1       6. For use in a video processing system of the type  
2 comprising a chain of video processing algorithms for processing a  
3 video stream, a system for optimizing at least one control  
4 parameter setting of at least one of said video processing  
5 algorithms in said chain of video processing algorithms, said  
6 system comprising:

7           a genetic algorithm unit comprising a genetic algorithm  
8 capable of optimizing said at least one control parameter setting  
9 of said at least one video processing algorithm.

1       7. The system as claimed in Claim 6 further comprising an  
2 objective quality metric unit coupled to said genetic algorithm  
3 unit, said objective quality metric unit capable of receiving an  
4 output video stream from said chain of video processing algorithms,  
5 and capable of determining a fitness value that characterizes the  
6 video quality of said output video stream, and capable of providing  
7 said fitness value to said genetic algorithm in said genetic  
8 algorithm unit.

1       8. The system as claimed in Claim 7 wherein said genetic  
2 algorithm in said genetic algorithm unit optimizes said at least  
3 one control parameter setting of said at least one video processing  
4 algorithm using said fitness value.

1        9. The system as claimed in Claim 6 wherein said genetic  
2 algorithm unit comprises a genetic algorithm that is capable of  
3 optimizing a plurality of control parameter settings of each of a  
4 plurality of video processing algorithms in said chain of video  
5 processing algorithms.

1        10. The system as claimed in Claim 9 further comprising an  
2 objective quality metric unit coupled to said genetic algorithm  
3 unit, said objective quality metric unit capable of receiving an  
4 output video stream from said chain of video processing algorithms,  
5 and capable of determining a fitness value that characterizes the  
6 video quality of said output video stream, and capable of providing  
7 said fitness value to said genetic algorithm in said genetic  
8 algorithm unit.

1        11. The system as claimed in Claim 10 wherein said genetic  
2 algorithm in said genetic algorithm unit optimizes a plurality of  
3 control parameter settings of a plurality of said video processing  
4 algorithms using said fitness value.

1        12. The system as claimed in Claim 11 wherein at least one of  
2 said plurality of control parameter settings comprises the order of  
3 application of said video processing algorithms in said chain of  
4 video processing algorithms.

1        13. The system as claimed in Claim 11 wherein at least one of  
2        said plurality of control parameter settings of said video  
3        processing algorithms comprises one of: a bit precision parameter,  
4        a noise reduction parameter, and a peaking parameter.

1        14. For use in a video processing system of the type  
2 comprising a plurality of chains of video processing algorithms for  
3 processing a plurality of video streams, a system for optimizing a  
4 plurality of control parameter settings of a plurality of video  
5 processing algorithms in said plurality of chains of video  
6 processing algorithms, said system comprising:

7            a plurality of genetic algorithm units coupled to said  
8 plurality of parallel chains of video processing algorithms, each  
9 of said plurality of genetic algorithm units comprising a genetic  
10 algorithm capable of optimizing said plurality of control parameter  
11 settings of said plurality of video processing algorithms; and

12            a plurality of objective quality metric units, each of said  
13 plurality of objective quality metric units coupled to one of said  
14 plurality of genetic algorithm units, each of said plurality of  
15 objective quality metrics capable of receiving an output video  
16 stream from one of said plurality of chains of video processing  
17 algorithms, and capable of determining a fitness value that  
18 characterizes the video quality of said output video stream, and  
19 capable of providing said fitness value to a genetic algorithm in a  
20 genetic algorithm unit to which said objective quality metric unit  
21 is coupled;

22            wherein said genetic algorithm in each of said plurality of  
23 genetic algorithm units optimizes a plurality of control parameter  
24 settings of said plurality of video processing algorithms using

25 said fitness values.

1 15. The system as claimed in Claim 6 comprising a genetic  
2 algorithm in which candidate solutions that will not provide an  
3 improvement in video quality are excluded.

1 16. The system as claimed in Claim 6 comprising a genetic  
2 algorithm in which a limited number of representative candidate  
3 solutions that are likely to provide an improvement in video  
4 quality are considered.

1 17. The system as claimed in Claim 6 comprising a genetic  
2 algorithm in which candidate solutions are considered that derive  
3 from previously existing desirable candidate solutions that are  
4 likely to provide an improvement in video quality.

1        18. For use in a video processing system of the type  
2 comprising a chain of video processing algorithms for processing a  
3 video stream, a method for optimizing at least one control  
4 parameter setting of at least one of said video processing  
5 algorithms in said chain of video processing algorithms, said  
6 method comprising the step of:

7            using an algorithm in an optimization unit to optimize said at  
8 least one control parameter setting of said at least one of said  
9 video processing algorithms.

51        19. The method as claimed in Claim 18 wherein said algorithm  
52 comprises a genetic algorithm.

53        20. The method as claimed in Claim 19 further comprising the  
54 steps of:

55            receiving an output video stream from said chain of video  
56 processing algorithms in an objective quality metric unit;

57            determining in said objective quality metric unit a fitness  
58 value for said output video stream;

59            providing said fitness value to said genetic algorithm; and

60            using said fitness value in said genetic algorithm to optimize  
61 said at least one control parameter setting of said at least one of  
62 said video processing algorithms.

1        21. The method as claimed in Claim 19 wherein said genetic  
2 algorithm is capable of optimizing a plurality of control parameter  
3 settings of each of a plurality of video processing algorithms in  
4 said chain of video processing algorithms.

1        22. The method as claimed in Claim 21 further comprising the  
2 steps of:

3            receiving an output video stream from said chain of video  
4 processing algorithms in an objective quality metric unit;

5            determining in said objective quality metric unit a fitness  
6 value for said output video stream;

7            providing said fitness value to said genetic algorithm; and

8            using said fitness value in said genetic algorithm to optimize  
9            said plurality of control parameter settings of a plurality of said  
10          video processing algorithms.

1        23. The method as claimed in Claim 22 wherein at least one of  
2            said plurality of control parameter settings comprises the order of  
3            application of said video processing algorithms in said chain of  
4            video processing algorithms.

1        24. The method as claimed in Claim 22 wherein at least one of  
2            said plurality of control parameter settings of said video  
3            processing algorithms comprises one of: a bit precision parameter,  
4            a noise reduction parameter, and a peaking parameter.